UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103

MEMORANDUM

DATE: 08/07/01

SUBJ: Technical Support Document for the Proposed Approval of Pennsylvania's Post-96 Rate-of-Progress Plan for the Philadelphia Severe Ozone Nonattainment Area.

FROM: Jill Webster, Environmental Scientist
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TO: File

BACKGROUND: Section 182(b)(1) of the Clean Air Aet (the Act) requires all moderate, serious, and extreme ozone nonattainment areas to reduce volatile organic compound (VOC) emission 15% from 1990 levels by 1996. That requirement is known as the 15% plan. Section 182(c)(2)(B) of the Act requires serious, severe, and extreme ozone nonattainment areas to reduce emissions of VOC by 3% per year every year from 1996 until their attainment dates. This requirement, known as the Post-96 rate-of-progress (ROP) plan, was originally due by November 15, 1994. However, in a March 2, 1995 memorandum, EPA Assistant Administrator Mary Nichols outlined an alternative attainment demonstration policy that combines the Post-96 ROP plan with the attainment demonstration requirements found in section 182(c)(2)(A) of the Act. This approach consists of two "phases". Phase I requires the states to submit a plan to meet ROP between 1996 and 1999, and a set of three enforceable commitments. For Phase II, states are required to submit ROP from 1999 to the area's attainment year, and modeled attainment demonstration.

On July 31, 1998, the Pennsylvania Department of Environmental Protection (PADEP) submitted a revision to the Pennsylvania Sate Implementation Plan (SIP) pertaining to the Phase I plan for the Philadelphia severe ozone nonattainment area. EPA received this revision on August 4, 1998. This submittal contains both the 1996 to 1999 ROP reductions, and the requirements described in the March 2, 1995 Mary Nichols memorandum.

On April 30, 1998 the Pennsylvania Department of Environmental Protection (PADEP) submitted a revision to the Pennsylvania State Implementation Plan (SIP) pertaining to the ROP demonstration for the 2002 and 2005 milestone years as well as an attainment demonstration for the Pennsylvania portion of the Philadelphia-Wilmington-Trenton ozone nonattainment area.

This document provides technical support for EPA's rulemaking on both, PADEP's July 31, 1998 submittal related to the 1999 ROP reduction and the April 30, 1998 submittal pertaining to the 2002 and 2005 ROP plan.

The review of the portions of the these two submittals (hereafter referred to as 1999, 2002, and 2005 plans) is limited to only those portions of the plan relating post 1996 ROP. EPA's review and action on the other portions-for example, base year inventory, 15% ROP plan, or contingency plan have or will be the subject of separate rulemaking actions. The 15% ROP has been the subject of a separate rulemaking action. The portion of the Phase II plan dealing with the attainment demonstration requirement of section 172(c)(1) and 182(c) of the Act are the subject of a separate rulemaking action [64 FR 70428, December 16, 1999]. The adequacy of those portions of the Phase 1 and Phase II plans that deal with the contingency measures requirements of section 172(c)(9) and 182(c)(9) of the Act will be the subject of a separate rulemaking action.

STATE'S SUBMITTAL AND EPA EVALUATION:

Commitments

The March 2, 1995 Mary Nichols memorandum required states to submit enforceable commitments to:

1) Participate in a consultive process to address regional transport,

2) adopt additional control measures, as necessary, to meet future rate of progress requirements and attain the one-hour ozone NAAQS, and

3) identify any reduction that are needed from upwind areas for the area to meet the NAAQS.

The commitment should specify a schedule for completing adoption of any additional rules.

Pursuant to that memorandum, PADEP's Phase I plan for the Philadelphia area contains three enforceable commitments. In section 3.2, Commitments for Future Action, the Commonwealth commits to:

a) continue to participate in a consultative process to address regional transport,

b) continue to identify emission reductions needed from upwind states, and

c) adopt additional control measures, as necessary, to meet future rate of progress requirements and attain the one-hour ozone NAAQS.

In section 3.3, Discussion of Commitments for Future Action, PADEP supports the commitments with a discussion of what the Commonwealth has done and plans to do for each commitment.

a) *Continue to participate in a consultative process to address regional transport*

The Commonwealth has been and continues to be involved in the Ozone Transport Assessment Group (OTAG)

b) *Continue to identify emission reductions needed from upwind states*

On August 14, 1997, Pennsylvania Governor Tom Ridge filed a petition asking EPA to take action under section 126 of the Clean Air Act to reduce air pollution coming into Pennsylvania from other states.

c) *Adopt additional control measures, as necessary to meet future rate of progress requirements and attain the one-hour ozone NAAQS*

"Pennsylvania commits to the development and implementation of control measures and requirements in accordance with the process provided by the APCA (Pennsylvania's Air Pollution Control Act) and other applicable laws that, along with reduction in transport, will result in reduction necessary for satisfaction of reasonable further progress requirements and attainment of the one-hour ozone standard." Pennsylvania reaffirmed this enforceable commitment to adopt addition control measures needed for attainment in a letter dated February 25, 2000, from Secretary Jim Seif to Regional Administrator Brad Campbell.

Rate of Progress Plan

At total VOC reduction of 42% is required by the Commonwealth. As previously mentioned the Commonwealth has achieved 15% of the total. This leaves a 27% VOC reduction as a requirement to be achieved by 2005. This document reviews the Commonwealth's ROP plan for milestone years 1999, 2002,and 2005. The key elements for this and any ROP plan are (1) base year inventories, (2) target level calculations, and (3) control measures.

(1) Emission Inventories and Growth

To determine ROP, the Commonwealth used 1990 as a base year and the target years are 1999, 2002, and 2005. Base year emissions data is found in Section 4, 1990 Base Year Inventory, of PADEP's Phase I submittal. PADEP summarizes the 1999 uncontrolled emissions in Section 6 of the Phase I plan and in Section 3.2.1 of the Phase II submittal. PADEP includes a discussion of growth projection methodologies in both the Phase I and Phase II submittals.

Growth Factor Methodology

PADEP ROP plans use growth factors from the Bureau of Economic Analysis (BEA) to derive growth factors for point sources, most area sources, and non-road mobile emissions sources. PADEP's ROP plan assumes linearity of the BEA data and uses linear interpolation of the BEA factors from the years 1988, 1995, 2000, and 2005 to generate estimates for 1990, 1999, and 2002. BEA data from 1973 and 1979 was excluded, since the economic changes in Pennsylvania in those years creates a nonlinearity in the interpolation. BEA data from 2010 and 2040 was excluded because of PADEP's lack of confidence in its accuracy.

Point Source Emissions Growth Calculation

PADEP summed the emissions for each 2-digit Standard Industrial Classification (SIC), which is industrial source category based, and applied the growth factor to the entire emission attributable to that 2-digit SIC grouping. For its point source inventory, Pennsylvania matched BEA growth projections for 57 industrial categories to similar two-digit SIC codes used in the inventory.

Area Source Emissions Growth Calculation

With the exception of gasoline marketing, growth factors were based on BEA data. For the most part, employment and population data were utilized. Gasoline marketing growth is determined by growth in vehicle miles traveled (VMT), and is calculated using MOBILE 5a. PADEP included the area source growth factors in Table 12 of the Phase I submittal and Table 8 of the Phase II submittal.

Nonroad Engine Emissions Growth Calculation

Growth factors from the BEA were used for the non-road mobile sources. Tables 14 and 9 of the Phase I and Phase II plan, respectively, lists the growth indicators for each category.

Highway Vehicle Emissions Growth Calculation

Highway vehicle emissions and growth (and as previously mentioned gasoline marketing) are projected based on the projected increase in Vehicle Miles Traveled (VMT). This projection was derived from MOBILE5aH modeling meshed with VMT data using Pennsylvania's Post Processor for Air Quality (PPAQ) to determine projected highway emission for 1999, 2002, and 2005. Documentation for PADEP's calculations for highway vehicle emissions growth is detailed in section 6.5 of the Phase I submittal and section H. of Appendix III of the Phase II submittal.

Summary of Projected Emissions, 1990 - 2005 in PADEP's ROP Plans

The following summarizes VOC and NOx emissions expected if no new additional controls (post 1990 controls) were in effect. These estimates are considered uncontrolled inventories, that take into account growth in each category.

VOC "Uncontrolled" Emissions (in tons per day)

	1990	1999	2002	2005
Point	153	162	166	169
Area	194	203	205	207
Nonroad	81	83	83	84
Highway Vehicle	188	177	180	187
totals	616	625	634	647

NOx "Uncontrolled" Emissions (in tons per day)

	1990	1999	2002	2005
Point	162	177	182	187
Area	47	47	47	47
Nonroad	158	74	75	75
Highway Vehicle	72	156	157	160
totals	434	455	461	469

EPA evaluation (1990 base year inventories): EPA approved PADEP's 1990 base year VOC

emission inventory for the Philadelphia area on June 9, 1997 [62 FR 31343]. (Technical amendment published in the Federal Register on January 6, 1998) EPA approved the 1990 base year NOx emissions inventory, submitted with the 1999 ROP plan, on June 17, 1999 [64 FR 32424].

EPA evaluation (1999-2005 projected inventories): The Commonwealth's growth projection methodologies are acceptable methods as listed in EPA's preparation guidance and guidance for growth factor estimation.

(2) Target Level Calculations

PADEP built upon the 15% calculations to determine the target level for its milestone year of 1999.

Rate of Progress (ROP) Target Level Calculation		
Steps	Equation/Method (Calculation)	tons per day (tpd)
1. Develop the 1990 VOC ROP base year inventory	Actual emission from all anthropogenic (point, area, and mobile) sources	616
2. Calculate the 1990 adjusted VOC base year inventory	1990 VOC base year inventory minus FMVCP/RVP reductions between 1990 and 1999 (616 - 39) Note: "FMVCP/RVP reduction between 1990 and 1996" is the non creditable emission reductions from these pre-1990 control measures (39 tpd)	576
3. Calculate the required reduction	9% of the 1990 adjusted VOC base year inventory (576 x 0.09)	52
4. Calculate the 1990 ROP target level	previous target - required reduction - fleet turnover correction (494 - 52 -6) Note: "fleet turnover correction" is the FMVCP/RVP reductions between 1990 and 1999 minus FMVCP/RVP reductions between 1990 and 1996 (39 - 33 = 6)	436
5. Calculate the reductions needed for ROP	1999 uncontrolled emissions - 1999 target (625 - 436) Note: "1999 uncontrolled VOC emissions" is the 1990 VOC base year inventory projected to 1999 (625)	189

PADEP's calculation method for VOC target levels follows EPA's guidance, and is technically

correct.

In the Post 1996 ROP plan, reductions in NOx emissions account for a large part of emission reductions needed to meet the Philadelphia area's 1999 ROP target level. In the plan, PADEP calculates a VOC to NOx ratio. PADEP then converts NOx reductions to "VOC equivalents" by multiplying the NOx emission reduction times the VOC to NOx ratio. PADEP then adds the "VOC equivalent" reductions to the VOC emission reductions, and compares that to its VOC emissions target.

Section 182(c)(2)(C) of the Act allows states to substitute NOx emissions reductions for VOC emission reductions to meet Post 1996 ROP requirements. Section 4, NOx Emission Reductions, of EPA's January 1994 guidance document, "Guidance on the Post-96 Rate-of-Progess Plan and Attainment Demonstration," (EPA-452/R-93-015), summarizes how states can use NOx reductions in their Post-1996 ROP plans. This guidance states that the sum of all creditable VOC and NOx emissions must equal three percent per year, averaged over each applicable milestone period. The percent reductions for VOC and NOx are determined from the ROP inventories for VOC and NOx, respectively.

While PADEP's use of a VOC/NOx ratio and VOC equivalents seems logical, it does not take into account the fact that VOC and NOx emissions grow at different rates. Furthermore, this method assumes the 1990 to 2005 FMVCP/RVP reductions for VOC and NOx are in the same proportion as the adjusted base year inventories, i.e. the ratio of VOC FMVCP/RVP reductions to NOx FMVCP/RVP reductions is the same as the previously calculated VOC/NOx ratio.

Since areas are required to reduce emissions by 3 percent per year, and offset growth, if an area wished to substitute NOx for VOC, then growth in both NOx and VOC emissions must be offset. This is why EPA's guidance requires the calculation of both NOx and VOC target levels to determine the amount of NOx and VOC emission reductions needed to meet the ROP requirement. In order to meet ROP, the Post-1996 ROP plan must result in creditable reductions that meet both the VOC and NOx target levels. Even if an area chooses to substitute NOx reductions to achieve the entire 27% reduction required, a VOC target level must be calculated to ensure that at a minimum, VOC growth in the 1996 to 2005 period is offset by emission reductions in that same period. As long as PADEP's Post-1996 ROP plan achieves creditable VOC and NOx that result in at least 27% reduction in VOC and NOx , and growth between 1990 and 2005 is offset by emission reductions, NOx substitution is acceptable.

In order to determine the VOC reduction needed to offset VOC emissions growth, EPA used data from PADEP's Phase I and Phase II plan to calculate 1999, 2002, and 2005 VOC and NOx target levels. EPA started by assuming no additional VOC reductions in 1999. These calculations are shown in the following tables, for each milestone year starting with 1999.

1999 Rate of Progress (ROP) VOC & NOx Target Level Calculation
9% ROP = 0% VOC + 9% NOx

0% VOC	
Steps	tpd VOC
1. 1990 ROP base year inventory = 1990 base year inventory - biogenic emissions	732 - 116 = 616
2. 1990 adjusted base year inventory = 1990 ROP base year inventory - 1990 to 1999 FMVCP/RVP reductions	616 - 39 = 576
3. 1999 target level = 1996 target - required reduction - fleet turnover correction	494 - 0 - 6 = 488
5. Reduction needed to offset VOC growth = 1999 uncontrolled emissions - 1999 target	625 - 488 = 137
9% NOx	
Steps	tpd NOx
1. 1990 ROP base year inventory (sum of all point, area, and mobile source emission)	440
2. 1990 adjusted base year inventory = 1990 ROP base year inventory - 1990 to 1999 FMVCP/RVP reductions	440 - 20 = 420
3. Required reduction = 9% x 1990 adjusted base year inventory	9% x 420 = 38
4. 1999 ROP target level = 1990 ROP base year inventory - required reduction - 1990 to 1999 FMVCP/RVP reductions	440 - 38 - 20 = 382
5. Reductions needed for ROP and to offset NOx growth = 1999 uncontrolled emissions - 1999 target	455 - 382 = 73

2002 Rate of Progress (ROP) VOC & NOx Target Level Calculation **9% ROP = 5% VOC + 4% NOx**	
5% VOC	
1. 1999 VOC target level	488
2. Required reduction = 5% x 2002 adjusted VOC inventory	5% x 572 = 28.6

3. 2002 ROP target level = 1999 ROP target level - required reduction - fleet turnover correction	488 - 28.6 - 3.81 = 455.6
4. Reductions needed for ROP and to offset growth = 2002 uncontrolled emissions - 2002 ROP target	634.5 - 455.6 = 179
4% NOx	
1. 1999 NOx target level	382
2. Required reduction = 4% x 2002 adjusted NOx inventory	4% x 416.8 = 16.7
3. 2002 ROP target level = 1999 ROP target level - required reduction - fleet turnover correction	382 - 16.7 - 3.23 = 362.3
4. Reductions needed for ROP and to offset growth = 2002 uncontrolled emissions - 2002 ROP target	461.35 - 362.3 = 99

2005 Rate of Progress (ROP) VOC & NOx Target Level Calculation 9% ROP = 4% VOC + 5% NOx	
4% VOC	
1. 2002 VOC target level	455.6
2. Required reduction = 4% x 2005 adjusted VOC inventory	4% x 571.75 = 22.8
3. 2005 ROP target level = 2002 ROP target level - required reduction - fleet turnover correction	455.6 - 22.8 - 1.56 = 431.2
4. Reductions needed for ROP and to offset growth = 2005 uncontrolled emissions - 2005 ROP target	647.08 - 431.2 = 215.9
5% NOx	
1. 2002 NOx target level	362.3
2. Required reduction = 5% x 2005 adjusted NOx inventory	5% x 415.5 = 20.8

3. 2005 ROP target level = 2002 ROP target level - required reduction - fleet turnover correction	362.3 - 20.8 - 1.28 = 340.2
4. Reductions needed for ROP and to offset growth = 2005 uncontrolled emissions - 2005 ROP target	469.2 - 340.2 = 129

The following summarizes the emission reductions needed and the emission reduction claimed by the Commonwealth.

ROP Milestone year	VOC needed	VOC claimed	NOx needed	NOx claimed
1999	137	*146*	73	*81*
2002	179	*189*	99	*102*
2005	216	*222*	129	*159*

Based on EPA's calculations, it appears that PADEP's plan has the potential to meet ROP emission reduction requirements.

Control Measures

Reformulated Gasoline (RFG)

The reductions claimed for RFG are summarized in the SIP revision dated January 20, 2000. PADEP revised the highway vehicle emission estimates to include more stringent standards for heavy duty engine standards and the National Low Emission Vehicle program. The submittal included revised RFG estimates for all three milestone years. Tables 2a. and 2b. summarized reductions claimed from the Federal RFG program for both VOC and NOx respectively. PADEP used MOBILE5aH to project these emission reductions. PADEP also updated the NOx credit to include additional NOx benefit from the Phase II RFG program. The Commonwealth claim the following reductions from RFG.

ROP Milestone year	VOC	NOx
1999	22.56	0.47
2002	35.24	7.17
2005	36.59	7.45

EPA evaluation: This is a federally implemented control measure. Section 211(k) of the Act requires that, beginning January 1, 1995, only reformulated gasoline be sold or dispensed in ozone nonattainment areas classified as severe or worse. As a severe area, Philadelphia benefits from the emission reductions from this program with fully creditable reductions.

FMVCP and Tier I

PADEP calculated Tier I reductions for the Philadelphia nonattainment area using the MOBILE5aH model. Beginning in the 1994 model year (i.e. mid-late 1993) newly manufactured vehicles have begun to comply with Tier I. The MOBILE modeling information is fed into the Post Processor for Air Quality (PPAQ), which determines MOBILE emissions factors and combines them with the appropriate VMT, to yield a final emissions reduction total. PADEP January, 2000 submittal claims the following reductions from the FMVCP.

ROP Milestone year	VOC	NOx
1999	6.95	14.11
2002	13.12	22.59
2005	20.35	27.36

EPA evaluation: This is a federally implemented control measure and the MOBILE5 model automatically applies FMVCP controls (unless that feature is disabled). Therefore, the FMVCP controls are fully creditable.

Enhanced I/M

PADEP used MOBILE5aH to project emission reductions in VOC and NOx from the enhanced I/M program. PADEP submitted its enhanced I/M program to EPA as a SIP revision on March 22, 1996, in response to the National Highway Designation Act (NHS), which was enacted on December 15, 1995. EPA granted interim conditional approval of PADEP's program on January 28, 1997. Implementation of the program commenced on October 1, 1997. Appendix V of the July 31, 1998 submittal and Appendix III. H. of the April 30, 1998 submittal includes the documentation for PA's emission reduction calculation.

EPA evaluation: On January 28, 1998, EPA granted conditional interim approval of the Pennsylvania's enhanced I/M program. PADEP made submittals to satisfy all conditions of this rulemaking. On June 8, 1999, EPA lifted the interim nature of its conditional interim approval [64 FR 30399]. On June 17, 1999 [64 FR 32411], EPA converted its conditional approval of Pennsylvania's enhanced I/M program to full approval. The emission reductions from the approved enhanced I/M are fully creditable.

ROP Milestone year	VOC	NOx
1999	58.69	32.22
2002	61.44	32.73

2005	65.38	33.89

Stage II Vapor Recovery

Section 2.b) of PADEP's Phase II plan summarizes Stage II reductions for all three milestone years (1999, 2002, and 2005). PADEP explains that this control measure includes emission reductions from the installation of Stage II vapor recover nozzles at gasoline dispensing facilities as well as reductions from the federal Onboard Vapor Recovery Program.

PADEP used EPA's AP-42 to determine the emission factor for vehicle refueling. The emission factor that PADEP used, 11.7 pounds per 1000 gallons, is the sum of the Stage II emissions factor and the spillage factor. PADEP used 1990 fuel sales data for the Commonwealth of Pennsylvania from the Department of Revenue. Fuel sales were apportioned by county, based on county VMT data. Fuel sales were projected to 2005 based on the Pennsylvania Department of Transportation's (PennDOT's) projections for growth in VMT. Finally, MOBILE5b was used to determine emission factors for Stage II control. PADEP calculated the following emission reductions from Stage II.

ROP Milestone year	VOC
1999	17.71
2002	19.82
2005	21.25

EPA evaluation: EPA approved Pennsylvania's Stage II vapor recovery regulation on December 13, 1995 [60 FR 63938]. The federally approved Stage II regulation requires the use of vapor recovery nozzles at gas stations through a phased compliance schedule, but the last group of stations (pumping less than 100,000 gallons of gasoline per month) were required to comply with this requirement by no later than February 8, 1994 in all moderate and above ozone nonattainment areas. These reductions claimed by PADEP are fully creditable.

OTC NOx MOU

The 1990 Clean Air Act created the northeast Ozone Transport Region (OTR) in recognition that ozone is a regional problem that requires a regional planning approach. The OTR includes the States of Maine, New Hampshire, Massachusetts, Vermont, Connecticut, Rhode Island, New York, Pennsylvania, Maryland, Delaware, Washington DC, and portions of northern Virginia. The Ozone Transport Commission (OTC) is a planning body composed of representatives of each of the OTR states. The OTC makes recommendations on strategies for reducing ozone levels throughout the OTR. On September 27 1994, the OTC initiated a major agreement to cut emissions of NOx from power plants and other large stationary sources NOx sources. The agreement put forth was Memorandum of Understanding (MOU) that committed states in the OTR to reduce NOx emissions in three phases. The first phase of NOx reductions outlined in the

MOU was NOx RACT level of control. The second and third phases are more stringent than RACT. Pennsylvania was a signatory to the OTC NOx MOU, and has committed to Phase II controls.

The OTC NOx MOU is divided into two zones. The MOU's requirements are more stringent for the inner zone than the outer zone. The five-county Philadelphia area is in the inner zone. The second phase of NOx reductions requires affected sources in the "inner zone" to either (1) reduce NOx emissions 65 percent from 1990 base year levels by May 1, 1999, or (2) to emit NOx at a rate no greater than 0.2 pounds per million British Thermal Unit (MMBtu). These requirements apply to fossil-fuel fired combustion units with rated heat capacity of at least 250 MMBtu/hour, and electric generating facilities of 15 megawatts or greater.

PA claims the following reductions in NOx for applicable milestones years.

ROP Milestone year	NOx
1999	27.37
2002	30.82
2005	34.20

EPA evaluation: On June 6, 2000 [65 FR 35840] EPA approved the PA NOx Allowance Requirements, implementing the OTC MOU. Therefore, the NOx reductions claimed by PA are fully creditable.

RACT

In severe nonattainment areas, the Act requires Reasonably Available Control Technology (RACT) controls on all VOC sources for which EPA has issued a control techniques guideline (CTG). RACT controls are also required on all "major sources" VOC and NOx with the potential to emit 25 tons per year or greater. Compliance was required by May 31, 1995. EPA has issued CTGs for a number of VOC source categories. These CTGs define a presumptive level of RACT control for a source category. Source categories for which EPA has not issued a CTG, are known as "non-CTG" sources. EPA has not issued any CTGs for NOx sources.

On February 4, 1994, PADEP submitted a revision to its SIP for the control of VOC and NOx emissions from major sources (Pennsylvania Chapters 129.91 through 129.95). This submittal was amended with a revision on May 3, 1994 correcting and clarifying the presumptive NOx RACT requirements under Chapter 129.93. The SIP revision consists of new regulations that require sources that have the potential to emit 25 tons per year (tpy) or more of VOC and NOx in the Philadelphia area to comply with reasonably available control technology requirements by May 31, 1995. While the regulations contain specific provisions requiring major VOC and NOx sources to implement RACT, the regulations do not contain specific emission limitations in the form of a specified overall percentage emission reduction requirement or other numerical emission standards. Instead, the regulations contain technology-based or operational "presumptive RACT emission limitations" for certain major NOx sources. For other major NOx

sources and all covered major VOC sources, the submittal contains a "generic" RACT provision. A generic RACT regulation is one that does not impose specific up-front emission limitations but instead allows for future case-by-case determinations. This regulation allows PADEP to make case-by-case RACT determinations that are then submitted to EPA as revisions to the Pennsylvania SIP.

PADEP takes credit for emission reductions from RACT controls on a number of VOC and NOx sources in the Philadelphia area. The following table lists the RACT sources that PADEP takes credit for ROP in 1999, 2002, and 2005.

Emission Reductions Claimed in the Philadelphia ROP plan for VOC Case-by-Case RACT			
Source	1999 VOC Reductions Claimed (tpd)	2002 VOC Reductions Claimed (tpd)	2005 VOC Reductions Claimed (tpd)
Fasson - Division of Avery	6.54	6.74	6.94
PECO Energy - Cromby	0.03	0.04	0.04
ICI/NP	0.27	0.27	0.29
Norwood Industries	2.12	2.19	2.27
Philadelphia Baking	0.12	0.12	0.13
Nabisco	0.33	0.34	0.34
Continental Baking	0.41	0.41	0.41
Total VOC Reductions Claimed	**9.82**	**10.11**	**10.42**

Emission Reductions Claimed in the Philadelphia ROP plan for NOx Case-by-Case RACT			
Source	1999 NOx Reductions Claimed (tpd)	2002 NOx Reductions Claimed (tpd)	2005 NOx Reductions Claimed (tpd)
PECO Energy - Cromby	0.01	0.02	0.02
Transcontinental Gas Pipeline	3.62	3.71	3.8
Sun Refining & Marketing	1.99	2.0	1.99
Philadelphia Baking	0.01	0.01	0.01
Total Nox Reductions Claimed	**5.63**	**5.74**	**5.82**

EPA evaluation: On February 23, 1998, EPA granted conditional limited approval to PADEP's generic VOC and NOx RACT regulations. The conditions to convert this conditional limited approval to limited approval are that Pennsylvania must submit all case-by-case RACTs to EPA as SIP revisions within one year of the effective date of EPA's final conditional approval (i.e. by April 22, 1999), and certify either 1) that there are no additional sources to which the RACT requirement is applicable, or 2) demonstrate that the emissions remaining from the sources subject to the RACT requirements are de minimis. On April 22, 1999, Pennsylvania submitted a demonstration to meet the conditions set forth in this notice. EPA has either fully approved and will propose approval of the NOx and VOC RACTs for which the Commonwealth assumes credit with the exception of two sources. EPA will propose approval of the Transcontinental Pipeline and Philadelphia Baking RACT submittals, in the near future, therefore credit is assumed at this time. RACT for PECO Cromby and Sun Refining and Marketing credit is not assumed for these sources, at this time.

The following RACT sources identified by PADEP as providing VOC reductions for ROP, summarized above have been approved into the PA SIP.

VOC RACT SIP approval status		
Fasson-Division of Avery	approved December 15,2000 [65 FR 78418]	PA referred to this source as the Avery Denison Corp.
PECO Energy-Cromby	Not yet creditable	
ICI/NP	approved April 18, 1997 [62 FR 19047]	PA referred to this source as ICI Fluoropolymers in the RACT submittal
Norwood Industries	approved December 15, 2000 [65 FR 78418]	
Philadelphia Baking	propose approval, near future	
Nabisco	approved December 15, 2000 [65 FR 78418]	
Continental Baking	approved December 15, 2000 [65 FR 78418]	

NOx RACT SIP approval status		
PECO Energy - Cromby	Not yet creditable	
Transcontinental Gas Pipeline	propose approval, near future	
Sun Refining & Marketing	Not yet creditable	

Philadelphia Baking	propose approval, near future	

Autobody Refinish Coatings

State Submittal: According to EPA's guidance and proposed national autobody refinishing rule, PA claimed a 37% reduction form this source category. PADEP used projected uncontrolled VOC emissions to calculate emissions reductions.

According to EPA's guidance and proposed national rule, PA claimed a 37% reduction from this source category.

EPA evaluation: This is a federally implemented control measure. EPA's final rule, "National Volatile Organic Compound Emission Standards for Automobile Refinish Coatings," was published on September 11, 1998 (63 FR 48806), will result in a smaller emission reduction than the proposed 37%. The 37% emission reduction was an estimate of the total nationwide emission reduction. Since this number was an overall average, it was not applicable to any specific area. For example, in California the reduction from the national rule is zero because its rules are more stringent than the national rule. In the proposed rule, the estimated percentage reduction for areas that were unregulated before the national rule was about 40%. If an area were unregulated before the national rule, the 40% would be our estimate except for one rule change made between proposal and final: the exemption of lacquer topcoats. As a result of that exemption, the reduction for previously unregulated areas is about 36%. The 36% reduction is not explicitly stated in the final rule, but it can be calculated using the emission reduction spreadsheet for the final rule, which is in EPA's rulemaking docket.

EPA reviewed the area source emission data and projections that PADEP included in the 1996, 1999, and 2005 plans and are summarized in the following table

Federal Autobody Refinishing reductions claimed (tpd)		
1999	2002	2005
6.01	6.07	6.12

PADEP revised the autobody rule in 1999, and EPA approved the revisions on August 14, 2000 [65 FR 49501]. The revised rule will achieve the 37% assumed reduction from the measure. EPA found the PADEP achieves a 36% reduction for milestone 1999 and 37% for years 2002 and 2005.

Federal Autobody Refinishing reductions creditable (tpd)		
1999	2002	2005
5.95	6.07	6.12

Consumer Products

State Submittal: PADEP claimed a 20% reduction from this control measure.

EPA evaluation: This is a federally implemented control measure. The final rule "National Volatile Organic Compound Emission Standards for Consumer Products," (63 FR 48819), published on September 11, 1998, results in a 20% reduction.

EPA reviewed the area source emissions data and projections that PADEP included in the 1999, 2002, and 2005 plans and concluded that PA used the overall consumer & commercial products emission factor, 6.3 pounds per capita annually, to calculated the 1999, 2002, and 2005 projected emissions for this category. EPA's review of the PADEP's plan determined that PA used an overall growth factor of 6.3 pounds per capita per year in the calculations.

EPA's consumer products rule only covers a subset of that source category. The proper emission factor is 3.9 pounds per capita annually, which is specified in the June 22, 1995 memorandum from John Seitz, Director of EPA's office of Air Quality Planning and Standards, entitled "Regulatory Schedule for Consumer and Commercial Products under Section 183(e) of the Clean Air Act." Therefore, PA overestimated the creditable emission reduction by a factor of 1.62 (6.3 divided by 3.9 = 1.62).

The following table summarizes the reduction claimed by PADEP, assuming an annual 6.3 pounds per capita emission factor.

Consumer Products reductions claimed (tpd)		
1999	2002	2005
6.64	6.71	6.77

EPA estimated the fully creditable reduction to be 62% of the reductions claimed by PADEP and are summarized in the following table. (1.00 divided by 1.62 = 0.62)

Consumer Products fully creditable reductions (tpd)		
1999	2002	2005
4.12	4.16	4.20

Architectural and Industrial Coatings (AIM)

State Submittal: PADEP claims a 15% reduction from this source category, which covers categories of Architectural Coatings, Special Purpose Coatings, and High Performance Coating.

AIM reductions claimed(tpd)		
1999	2002	2005
7.33	7.38	7.43

EPA evaluation: This is a federally implemented control measure. EPA's final rule "National Volatile Organic Compound Emission Standards for Architectural Coatings," (63 FR 48848), published on September 11, 1998, result in a 20% reduction.

EPA reviewed the area source emissions data and projections that PA included in the 1999, 2002, and 2005 plans. PADEP assumed a 15% reduction from this category, so the reductions are slightly underestimated by PADEP.
The following VOC reduction are fully creditable for this federal measure.

AIM reductions fully creditable (tpd)		
1999	2002	2005
7.33	7.38	7.43

Treatment, Storage, and Disposal Facilities (TSDFs)
State Submittal: PADEP states that the federally-implemented Phase II TSDF standards require 93% control of emission from this source category. PADEP estimated the following reductions, assuming 80% rule effectiveness.

TSDFs reduction claimed (tpd)		
1999	2002	2005
9.52	9.61	9.70

EPA evaluation: This is a federally implemented control measure. EPA promulgated Phase I of the TSDF national rule on June 21, 1990 (55FR 25454). In a May 6, 1993 policy memo, "Credit Toward the 15 Percent Rate-of-Progress Reductions from Federal Measures" from G.T. Helms, Chief Ozone/Carbon Monoxide Programs Branch and Susan Wyatt, Chief, Chemicals and Petroleum Branch, to Air Branch Chiefs, Regions I-X, EPA specified that the maximum reduction limit that states could claim for Phase II of the national TSDF regulation is 93% of total TSDF emissions. The Phase II TSDF rule was published in the Federal Register on December 6, 1994 (59 FR 62896) and subsequently amended on February 9, 1996 (61 FR 4903) and November 25, 1996 (61 FR 59932). Final compliance with the Phase II requirements is required by no later than December 8, 1997.

TSDFs reductions fully creditable (tpd)		
1999	2002	2005
9.52	9.61	9.70

Rule Effectiveness for Point Sources
State Submittal: Rule effectiveness (RE) is a means of enhancing rule compliance by industrial sources, or generally improving implementation of existing regulations. Rule effectiveness is stated as a percentage of total available reductions from a control measure. The default assumption level for rule effectiveness is 80%. Pennsylvania claims RE improvements from the

80% default level to a level of 90%. PADEP claims reduction for RE for milestone years, 2002 and 2005.

PADEP is claiming rule effectiveness improvements to their RACT regulations (for the 5-county Philadelphia area) pertaining to 10 identified facilities located in the 5 county nonattainment area. PADEP utilized EPA's RE improvements matrix to estimate rule effectiveness for two categories, in the absence of quantifiable compliance or emissions data. RE measures are divided into 13 categories, which are: 1) training of plant operators, 2) inspector training, 3) educational opportunities for source, 4) procedures for operation and maintenance, 5) clarity of testing procedures and schedules, 6) rule effectiveness evaluation program, 7) monitoring, 8) type of inspection, 9) administrative authority-prison, 10) administrative authority- fines, 11) administrative authority-citations, 12) media publication of enforcement actions, 13) follow-up inspections.

The Commonwealth claims the following reductions from the listed facilities for the years 2002 and 2005.

VOC Rule Effectiveness Company	**2002 reductions**	**2005 reductions**
Pre Finish Metals, Inc.	0.39	0.41
Paramount Packaging	0.25	0.26
Cleveland Steel Container	0.02	0.02
Dunmore Corporation	0.11	0.11
NVF Co.	1.53	1.58
Reynolds Metals Co.	0.18	0.19
Congoleum Corp.	12.62	12.79
Brown Printing Co.	0.10	0.10
Allied Chemical Corp.	0.31	0.32
Kurz-Hastings Inc.	0.66	0.67
Total	**16.17**	**16.45**

EPA Evaluation: EPA's evaluation of PADEP's protocol and matrix for determining rule effectiveness follows guidance set forth by EPA. The reductions claimed by PADEP for RE are fully creditable for 2002 and 2005.

Source and Process Shutdowns

State Submittal: PADEP claims credit for source shutdowns for milestone years 2002 and 2005. Sources which were operational in 1990 and included in the inventory, but have since shutdown

were evaluated for ROP credit. PADEP also claims credit for some shutdown sources that did not apply to bank emission reduction credits (ERCs) within the regulatory deadlines established in 25 Pa Code section 127.207(2).

In addition, Pennsylvania regulations require a 1.3:1 offset ratio for banked emissions; which means that sources who have banked emissions under the provision of 25 Pa. Code 127(E) may use no more than 77% of these emissions at a later date. The remaining 23% are permanent reductions. The following table lists the sources and reductions claimed by PADEP for milestone years 2002 and 2005.

VOC shutdown company	2002	2005
Rohm & Haas Delaware (Bucks)	0.02	0.02
US Steel Corp	0.00	0.00
Quebecor Printing	0.00	0.00
Sun Refining & Marketing (Delaware)	0.04	0.04
BP Oil, Inc.	0.06	0.06
Congoleum Corp.	0.22	0.24
Sun Refining & Marketing (Philadelphia)	0.04	0.05
Rohm & Haas Delaware (Philadelphia)	0.06	0.07
Allied Chemical Corporation	0.76	0.87
Crown Cork & Seal	0.25	0.28
Progress Lighting Co.	0.01	0.01
Acme Markets	0.05	0.05
SKF Ind.	0.26	0.27
Schneider Bros. Co.	0.16	0.16
Monarch MFG Works, Inc.	0.08	0.09
Craft-Bilt Co.	0.15	0.15
Container Recyclers	0.10	0.10
Quality Container Company	0.14	0.14

U.S. Naval Base	0.12	0.12
U.S. Mint	0.07	0.07
Total	**2.59**	**2.79**

Compression-Ignition Engines

EPA requires nonroad compression ignition (diesel) engines greater than 50 horsepower (hp), which are not used in underground mining, locomotives and marine vessels to comply with Tier 1 emission standards which are to be phased in; phase in started in 1996. EPA promulgated further controls for engines of 50 hp or less which lead to 60 % further reductions in NOx. Both Tiers of controls are phased in from 1999 to 2006.

PADEP only took credit from the Federal compressed ignition engines rule in milestone year 2005 and full implementation was assumed.

EPA evaluation: PADEP applied the 60% control level to the pre-Tier 1 NOx emissions in the affected categories. The following reduction is claimed by PADEP for this federally implemented measure and are fully creditable for the 2005 milestone year.

Compression-Ignition Engines - Nonroad NOx Controls (tpd)	2005
	44.00

Spark Ignition Engines

In July 1995, EPA finalized the first federal regulation affecting small nonroad SI engines at or below 19 kilowatts (kW), or 25 hp. The first phase of the regulation (Phase 1) took effect for most new handheld and nonhandheld engines beginning in model year 1997, with an expected reduction of 32% of HC for these engines. Phase 2 of the handheld engine standard are estimated to reduce emissions 70% beyond the 32 % achieved with Phase 1.

EPA evaluation: PADEP does not assume any reductions from Phase 2 of the program. PADEP only assumes reductions from Phase 1 of the regulation and assumes a 32% reduction for milestone year 2005. The following reduction is claimed by PADEP for this federally implemented measure and are fully creditable for the 2005 milestone year.

Spark-Ignition Engines - Nonroad VOC Controls (tpd)	2005
	15.79

National Low Emission Vehicle (NLEV)

The National Low Emission Vehicle (NLEV) program is a nationwide clean car program not mandated by the Act, designed to reduce ground level ozone (or smog) and other air pollution emitted from newly manufactured motor vehicles. On June 6, 1997 [62 FR 31192] and on January 7, 1998 [63 FR 926], EPA promulgated rules outlining the framework for the NLEV

program. These NLEV regulations allow auto manufacturers to commit to meet tailpipe standards for cars and light-duty trucks that are more stringent thane EPA could otherwise mandate under the authority of the Act. The regulations provided that the program would come into effect only if Northeast states and auto manufacturers agreed to participate. On March 9, 1998 [63 FR 11374], EPA published a finding that the program was in effect. Nine northeastern states including the Commonwealth of Pennsylvania and 23 auto manufacturers had opted to participate in the NLEV program. Once in effect, the NLEV Program became enforceable in the same manner an any other Federal new motor vehicle emission control program.

The NLEV Program will result in substantial reductions in VOC and NOx emission which contribute to unhealthy levels of smog in many areas across the country. NLEV vehicles are 70% cleaner than those otherwise required under the Act. In the Northeast States, the phase-in of the NLEV vehicles began with model year 1999. In addition, the program provides substantial harmonization of Federal and California new motor vehicle standards and test procedures, which enables manufacturers to move towards the design and testing of vehicles to satisfy one set of nationwide standards. A SIP revision from each participating northeastern state is required as part of the agreement between states and automobile manufacturers to ensure the continuation of the NLEV to supply clean cars throughout most of the country.

EPA evaluation: On December 28, 1999 [64 FR 72564], EPA approved the Pennsylvania NLEV SIP submitted on January 8, 1999. Therefore, the following reductions are fully creditable for ROP.

National Low Emission Vehicle (tpd)		
	2002	2005
VOC	1.01	2.85
NOx	1.69	4.71

Heavy Duty Diesel Engines (HDDE)

In October 1997, EPA adopted new standards for NOx and hydrocarbons for model year 2004 and later heavy-duty diesel engines used in trucks and buses. The new standard represents a 50 percent reduction in NOx from the 1998 and later model year NOx standard.

This is a Federally implemented standard and the following reductions are fully creditable.

Heavy-Duty Diesel Engine Standard- NOx (tpd)	2005
	0.38

Motor Vehicle Emissions Budgets

Under EPA's transportation conformity rule, the post-1996 ROP plans are a control strategy SIP under the Transportation Conformity Rule, August 15, 1997 [62 FR 43779]. A control strategy SIP establishes budgets to which Federally funded and approved transportation projects and plans must conform. The ROP plans establishes VOC and NOx budgets for the Philadelphia area that are applicable for determinations for 1999, 2002, and 2005. These budgets are applicable in later years in the absence of other applicable budgets. On February 25, 2000, the Commonwealth amended the SIP with revised motor vehicle emissions budgets for the applicable milestone years. The February 25, 2000 SIP revision adopts and establishes the following motor vehicle emissions budgets for the Philadelphia area.

Table 4. Motor Vehicle Emissions Budgets for the Philadelphia area (Tons/day)

Milestone year	VOC	NOx
1999	88.6	109.6
2002	69.52	93.13
2005	61.76	86.42

Summary of Findings and Conclusion:

The following table outlines EPA's analysis of the fully creditable reductions in the PA plan. All numbers are in tons per day.

Control Measure	VOC			NOx		
	1999	2002	2005	1999	2002	2005
RFG	22.56	35.24	36.59	0.47	7.17	7.45
I/M	58.69	61.44	65.38	32.22	32.73	33.89
FMVCP and Tier 1	6.95	13.12	20.35	14.11	22.59	27.36
Stage II Vapor Recovery	17.71	19.82	21.25	---	---	---
OTC NOx MOU	---	---	---	27.37	30.82	34.20
RACT	9.79	10.07	10.38	3.63	3.72	3.81
Autobody Refinish Coatings	5.95	6.07	6.12	---	---	---
Consumer Products	4.12	4.16	4.20	---	---	---

AIM coatings	7.33	7.38	7.43	---	---	---
TSDFs	9.52	9.61	9.70	---	---	---
Rule Effectiveness for Point Sources	---	16.17	16.45	---	---	---
Shutdowns	---	2.59	2.79	---	0.94	1.21
Compression-Ignition Engines	---	---	---	---	---	44.00
Spark-Ignition Engines	---	---	15.79	---	---	---
NLEV	---	1.01	2.85	---	1.69	4.71
Heavy-Duty Diesel Engine Standard	---	---	---	---	---	0.38
Totals	**142.62**	**186.68**	**219.28**	**77.8**	**99.66**	**157.01**

ROP Milestone year	VOC needed	VOC creditable	NOx needed	NOx creditable
1999	137	142.62	73	77.8
2002	179	186.68	99	99.66
2005	216	219.28	129	157.01

EPA has determined that the PADEP has demonstrated ROP for the 1999, 2002, and 2005 milestone years.

CONCLUSION/RECOMMENDED ACTIONS

By proposing to approve the 1999, 2002, and 2005 ROP plan, EPA is also proposing that the motor vehicle emissions budgets (MVEBs) are adequate for meeting the ROP requirement for the Philadelphia area. I recommend approval of the 1999, 2002, and 2005 ROP plans and that the MVEBs are adequate for meeting the ROP requirement.